IRGM gene

immunity related GTPase M

Normal Function

The *IRGM* gene provides instructions for making a protein that plays an important role in the immune system. This protein is involved in a process called autophagy, which cells use to surround and destroy foreign invaders such as bacteria and viruses. Specifically, the IRGM protein helps trigger autophagy in cells infected with certain kinds of bacteria (mycobacteria), including the type of bacteria that causes tuberculosis. In addition to protecting cells from infection, autophagy is used to recycle worn-out cell parts and break down certain proteins when they are no longer needed. This process also plays an important role in controlled cell death (apoptosis).

Health Conditions Related to Genetic Changes

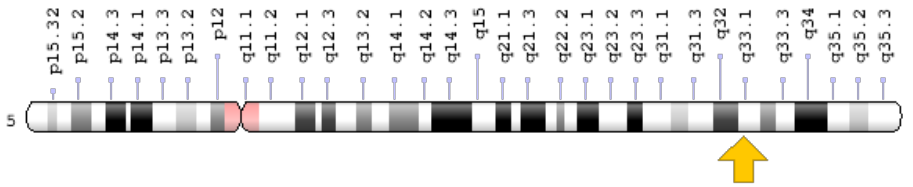
Crohn disease

Several variations in or near the *IRGM* gene have been associated with an increased risk of developing Crohn disease. This increased risk has been found primarily in white populations. *IRGM* variations change single DNA building blocks (nucleotides) in regions of DNA that may regulate when and how the IRGM protein is produced. It is unclear how these changes influence a person's chance of developing Crohn disease. Researchers suspect that changes involving the IRGM protein may disrupt the autophagy process, preventing the immune system from destroying harmful bacteria effectively. An abnormal immune response to bacteria in the intestinal walls may lead to chronic inflammation and the digestive problems characteristic of Crohn disease.

Chromosomal Location

Cytogenetic Location: 5q33.1, which is the long (q) arm of chromosome 5 at position 33.1

Molecular Location: base pairs 150,846,523 to 150,902,402 on chromosome 5 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- A1A4Y4_HUMAN
- IFI1
- immunity-related GTPase family, M
- immunity-related GTPase family, M1
- immunity-related GTPase M
- IRGM1
- LRG-47
- LRG-47-like protein
- LRG47
- MGC149263
- MGC149264

Additional Information & Resources

Educational Resources

- Eurekah Bioscience Collection: Origin and Evolution of Self-Consumption: Autophagy
  https://www.ncbi.nlm.nih.gov/books/NBK6274/

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28IRGM%5BTIAB%5D%29+OR+%28%28IRGM1%5BTIAB%5D%29+OR+%28LRG-47%5BTIAB%5D%29+OR+%28LRG47%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D

OMIM

- IMMUNITY-RELATED GTPase FAMILY, M
  http://omim.org/entry/608212

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_IRGM.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=IRGM%5Bgene%5D
- HGNC Gene Symbol Report
  http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=29597
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/345611
- UniProt
  http://www.uniprot.org/uniprot/A1A4Y4

Sources for This Summary

- Deretic V. Autophagy as an immune defense mechanism. Curr Opin Immunol. 2006 Aug;18(4):375-82. Epub 2006 Jun 19. Review.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16782319
- MacMicking JD. Immune control of phagosomal bacteria by p47 GTPases. Curr Opin Microbiol. 2005 Feb;8(1):74-82. Review.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/15694860

- Parkes M, Barrett JC, Prescott NJ, Tremelling M, Anderson CA, Fisher SA, Roberts RG, Nimmo ER, Cummings FR, Soars D, Drummond H, Lees CW, Khawaja SA, Bagnall R, Burke DA, Todhunter CE, Ahmad T, Onnie CM, McArdle W, Strachan D, Bethel G, Bryan C, Lewis CM, Deloukas P, Forbes A, Sanderson J, Jewell DP, Satsangi J, Mansfield JC; Wellcome Trust Case Control Consortium, Cardon L, Mathew CG. Sequence variants in the autophagy gene IRGM and multiple other replicating loci contribute to Crohn's disease susceptibility. Nat Genet. 2007 Jul;39(7): 830-2. Epub 2007 Jun 6.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/17554261
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2628541/
- Singh SB, Davis AS, Taylor GA, Deretic V. Human IRGM induces autophagy to eliminate intracellular mycobacteria. Science. 2006 Sep 8;313(5792):1438-41. Epub 2006 Aug 3.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16888103

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